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A NEW SPECIES OF INSECT OF THE ORDER PROTURA

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THE MEMBERS of the order Protura, usually placed in the class Insecta, are considered the most primitive members of the class. In 1938, Silvestri described the first South American proturan, *Acerentulus travassosi*, of the family Acerentomidae, from Brazil. The new species described in this paper seems to be the second proturan to be described from South America.

In 1948, Dr. F. Bonet, of the Escuela Nacional de Ciencias Biológicas, Mexico City, spent several months at the United States National Museum studying the Protura collection. I wish to acknowledge with much gratitude the help and suggestions he gave me in beginning work on this order.

I made the drawings for figures 85 and 86 with camera lucida. They were transferred and inked by Mrs. Aime M. Awl.

FAMILY EOSENTOMIDAE

*EOSENTOMON VENEZUELENSE*, new species

FIGURES 85, 86

The adults are dark yellow and well chitinized; the matusus junior is much less chitinized and the thorax and abdomen I-IV are white. An unexpanded female is  $797\mu$  long; the completely expanded male, holotype, is  $1,243\mu$  long. The head (fig. 85, *a*), is  $132-136\mu$  long; at its greatest width  $89-100\mu$ . In one female specimen, the head is sub-spherical,  $107\mu$  long by  $96\mu$  wide. The pseudoculi are oval,  $9-12\mu$  long.

THORAX

The first pair of legs is longest, the second pair shortest. Tarsus I (fig. 85, *e*) is  $98-107\mu$  long; claw  $17-18.5\mu$  long. From the dorsal,

median, club-shaped sensilla to the base of the tarsus is 52–57 $\mu$ . In addition to the seven blunt sensillae shown on the outer face of the tarsus in figure 85, *e*, there are three more on the inner face, their positions indicated by *x*. Tarsus III (fig. 85, *b*) with a large, heavy, subapical spine.

The anterior and posterior transverse apodemes and the median apodeme of the mesonotum are shown in figure 86, *b*. They were drawn from the stained specimen, and can be seen vaguely on the unstained specimens.

On the metanotum, the anterior transverse apodeme is more strongly developed than on the mesonotum and is bowed. From it, the median apodeme runs two-thirds the length of the metanotum, and is more noticeable than on the mesonotum, even on the unstained specimens. The posterior transverse apodeme is slightly more developed than the mesonotal one.

#### CHAETOTAXY OF THORAX

**PRONOTUM:** With two pairs of setae; median pair 46 $\mu$  apart, 17 $\mu$  long; outer pair 20 $\mu$  long, near the lateral border.

**MESONOTUM** (fig. 86, *b*): From median anterior to posterior margin 76 $\mu$ . Anterior setae (1a–4a): At the middle, setae 1 are 14 $\mu$  apart, 9 $\mu$  long; setae 2 are 22 $\mu$  from setae 1, and are 9 $\mu$  long; setae 3 are 23 $\mu$  anteriolateral from setae 2, and are 12 $\mu$  long; setae 4 are on the anteriolateral margin, 17 $\mu$  long. Posterior setae (1p–5p): At the posterior margin, setae 1 are 25 $\mu$  apart, 15 $\mu$  long; setae 2, slightly posterior of the chitinized margin, 14 $\mu$  long; setae 3 are 22 $\mu$  long; setae 4 are anterior to setae 3, near the lateral border, 9 $\mu$  long; setae 5 are anterior to setae 4, and are 29 $\mu$  long. Near or on the peritreme of the spiracle are two setae; the anterior is 15 $\mu$  long, the posterior is 11 $\mu$  long.

The number of setae and their approximate position correspond with that figured for *E. ribagai* Berlese (1909, pl. 3, fig. 22), and with that figured for *E. armatum* Stach by Tuxen (1949, Abb. 66). In *E. germanicum* Prell as figured by Prell (1913, pl. 3, fig. 11), the same condition prevails, except that setae 5p are missing. Gisin's figure of *E. armatum* Stach (1945, fig. 1) shows the same number of setae, but the position of the anterior setae is quite different. I have examined the holotype slides of *E. rostratum* Ewing (1940) and of *E. pallidum* Ewing (1921), and the number and approximate position of the setae are the same as for *E. venezuelense*.

**METANOTUM:** Same length as mesonotum. Anterior setae 1 are 34 $\mu$  from anterior transverse apodeme, 17 $\mu$  apart, 11 $\mu$  long; setae 2 are 11 $\mu$  long; setae 3 are 15 $\mu$  long; setae 4 are on the anteriolateral margin, 8 $\mu$  long, and close to each one is a microchaeta. Posterior setae 1 are on the transverse apodeme, 28 $\mu$  apart, 17 $\mu$  long; setae 2

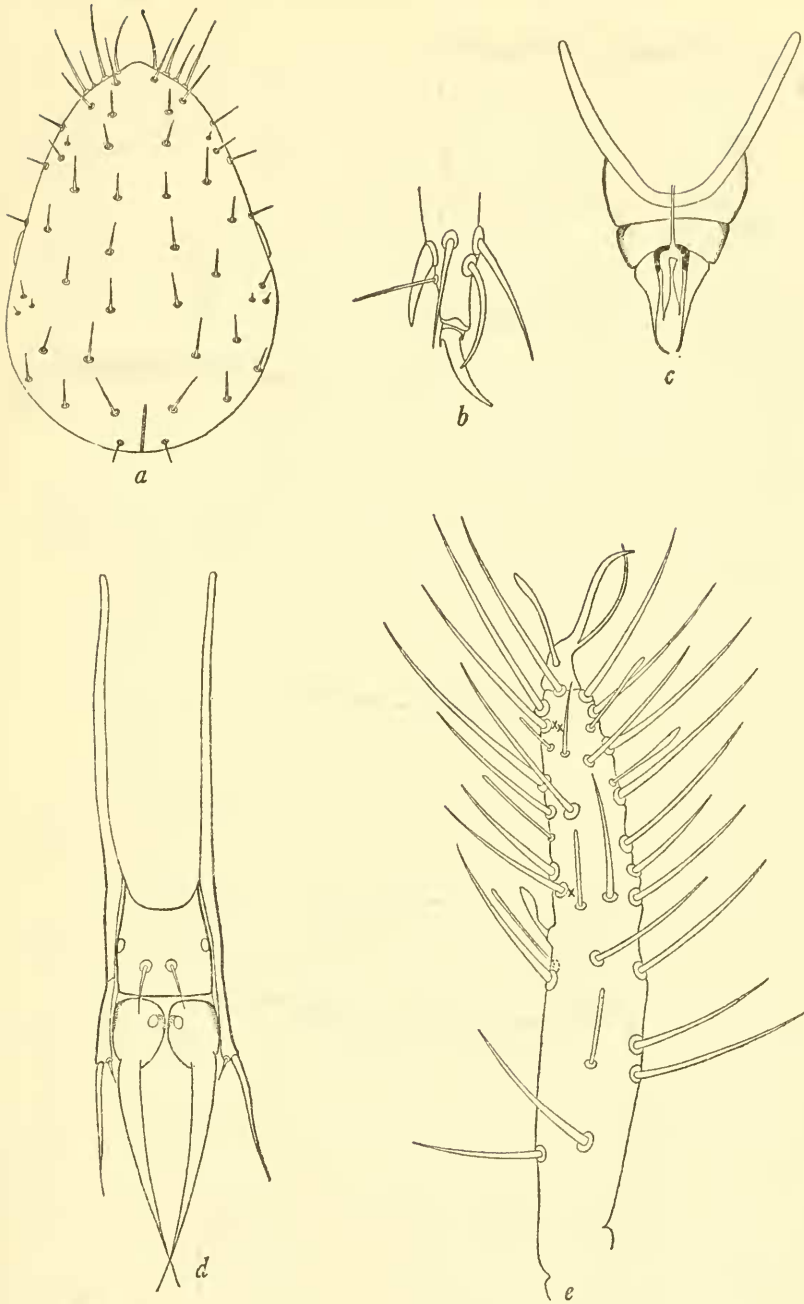


FIGURE 85.—*a*, Head of female (dorsal),  $\times 200$ ; *b*, claw and part of tarsus of leg III of matus junior,  $\times 450$ ; *c*, female genitalia,  $\times 450$ ; *d*, male genitalia,  $\times 450$ ; *e*, tarsus and claw of leg I (outer face) of matus junior,  $\times 450$  (x=position of additional sensillae on inner face).

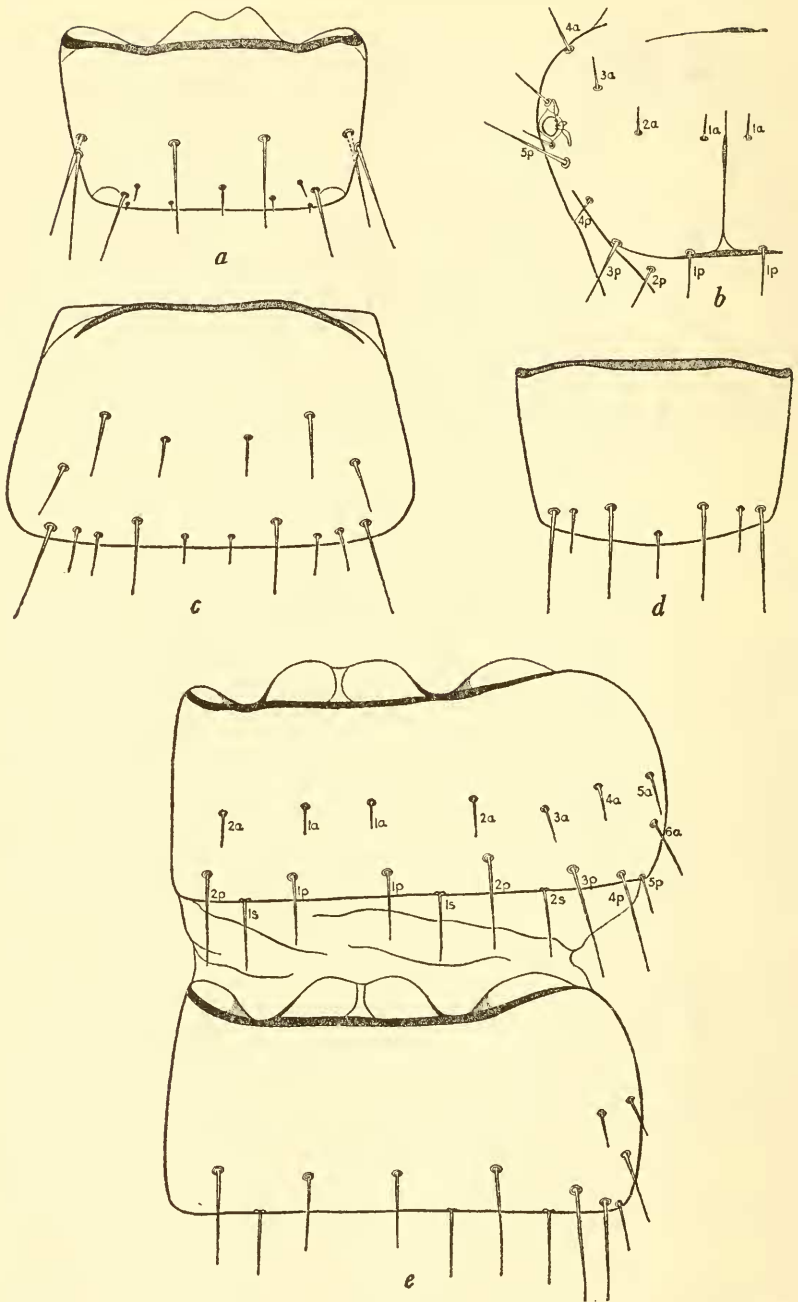


FIGURE 86.—*a*, Tergite VIII, holotype,  $\times 200$  (1a-4a= anterior pairs of setae; 1p-5p= posterior pairs of setae); *c*, sternite IV, holotype,  $\times 200$ ; *d*, sternite VIII, holotype,  $\times 200$ ; *e*, tergites IV and V, holotype,  $\times 200$  (1a-6a= anterior pairs of setae; 1p-5p= posterior pairs of setae; 1s-2s= supplementary pairs of setae).

are  $14\mu$  long; setae 3 are  $25\mu$  long; setae 4 are  $11\mu$  long; setae 5 are  $34\mu$  long. The anterior spiracular seta is  $14\mu$  long; the posterior  $9\mu$ .

The position of these setae approximates that given for *E. ribagai* Berlese (1909, pl. 3, fig. 22), except that the anteriolateral setae 4 with the microchaetae are missing. Berlese (1909, pl. 8, fig. 80), figures the tergite of the metathorax for *E. transitorium* Berlese on which anterior setae 4 with the microchaetae are missing as also are posterior setae 4. In *E. germanicum* Prell as figured by Prell (1913, pl. 3, fig. 11), anterior setae 4 with the microchaetae are missing as are posterior setae 5. Gisin's figure of *E. armatum* Stach (1945, fig. 1) lacks the anterior microchaetae and the position of the anterior setae is quite different; the same condition prevails in this same species as figured by Tuxen (1949, Abb. 66). I have examined the holotype slides of *E. rostratum* Ewing (1940) and of *E. pallidum* Ewing (1921); the number and approximate position of the setae are the same as for *E. venezuelense*.

#### ABDOMEN

Transverse apodemes present on tergites and sternites (fig. 86, *a*, *c-e*) of abdomen I-IX, but slightly developed on abdomen I; unbranched laterally. A pair of vestigial appendages ventrally on abdomen I-III, conspicuous, two-segmented.

#### CHAETOTAXY OF THE ABDOMEN

**TERGITES AND PLEURITES:** The tergites and the pleurites are fused on all abdominal segments except abdomen IX, X, and XI. In giving the arrangement and number of setae, I shall include all setae present on both. The setae are arranged more or less in one or two transverse rows on the most heavily chitinized portion; in all the following description I refer only to this chitinized portion. The rows are usually not straight, but slant posteriorly in the pleural region where the setae in the anterior row are not at all in alinement. Most of the setae are what I shall call primary ones, which vary greatly in length but are well chitinized, and their sockets are deep and heavy. In the posterior row there are also present what I shall call supplementary setae; these are usually not in alinement with the primaries, and are placed at the extreme posterior margin. They are long, slender, and slightly chitinized, about the same length, and their sockets are shallow and delicate. Also present in the posterior row are occasional microchaetae. The primary and supplementary setae are duplicated on the right and left sides except for an occasional single one, placed exactly in the middle. In referring to the setae, I shall call the median pair setae 1; then the one to the right and the one to the left of them, setae 2; et cetera. Wherever possible, the measurements have been taken from the holotype.

Tergite I: The anterior row of setae is slightly posterior of the middle of the tergite. Setae 1 are  $23\mu$  apart,  $9\mu$  long; setae 2 are equidistant from setae 1 and are  $12\mu$  long. In the posterior row, setae 1 are  $6\mu$  from the posterior margin,  $37\mu$  apart,  $25\mu$  long; setae 2 are  $29\mu$  from setae 1 and are  $28\mu$  long; setae 3 are on the margin,  $17\mu$  from setae 2 and are  $22\mu$  long. Very close and exterior to setae 3 are microchaetae. Between setae 1 and 2 on the margin are supplementary setae  $22\mu$  long. A formula for tergite I would be: Anterior row 2-2; posterior row 3-3+1-1 supplementaries +1-1 microchaetae.

The number of setae agrees with that given by Ionesco (1935) for the genus, and by Gisin (1945) and Tuxen (1949) for *E. armatum* Stach, except that none mentions the microchaetae.

Tergite II: The anterior row is at the middle of the tergite. Setae 1 are  $22\mu$  apart; setae 2 are  $28\mu$  from setae 1; setae 3 are  $31\mu$  from setae 2; setae 6 are posterior to setae 5; all are  $8-11\mu$  long. In the posterior row, setae 1 are  $32\mu$  apart,  $19\mu$  long and  $6\mu$  from the margin; setae 2 are  $35\mu$  from setae 1 and are  $28\mu$  long; setae 3 are on the margin,  $26\mu$  from setae 2 and are  $32\mu$  long; setae 4 are  $14\mu$  long; setae 5 are  $9\mu$  long. Between setae 1 and 2, and 2 and 3, are supplementary setae  $22$  and  $23\mu$  long. Formula: Anterior row 6-6; posterior row 5-5+2-2 supplementaries.

The number of setae differs from that given by Ionesco (1935) for the genus, and by Gisin (1945) and Tuxen (1949) for *E. armatum* Stach, in that there is an additional pair in the posterior row.

Tergite III: In the anterior row, the arrangement and number of the setae are the same as for tergite II; all are  $9-12\mu$  long. The same condition exists in the posterior row; the setae are the same length as, or slightly longer than, those on tergite II, except that setae 4 are  $29\mu$  long. Formula: Same as tergite II.

As noted on tergite II, there is one more pair of setae in the posterior row than is given by Ionesco (1935) for the genus, and by Gisin (1945) and Tuxen (1949) for *E. armatum* Stach.

Tergite IV (fig. 86, e): Anterior row (1a-6a) in middle of tergite. Setae 1 are  $23\mu$  apart; setae 2 are  $34\mu$  from setae 1; setae 3 are  $25\mu$  from setae 2; they increase in length from  $9-12\mu$ , except that setae 6 are  $20\mu$  long. The setae of the posterior row are spaced slightly closer to one another than on tergite II; primaries (1p-5p) slightly longer than on tergite III, except that setae 4 are  $32\mu$  long; supplementaries (1s-2s) same as on tergite II. The posterior row is not so close to the margin. Formula: Same as tergite II.

The number of setae agrees with that given by Ionesco (1935) for the genus, and by Gisin (1945) and Tuxen (1949) for *E. armatum* Stach.



Tergite V (fig. 86, *e*): In the anterior row, setae corresponding to 1, 2, and 3 of tergite IV are absent; setae 4 are  $12\mu$  long; setae 5 are  $14\mu$  long; setae 6 are  $23\mu$  long, posterior to setae 5; these are all in the pleural region. The posterior row is slightly more anterior from the margin, setae 1 being  $9\mu$  distant; the setae are spaced about as on tergite IV; primary setae mostly slightly longer than on tergite IV; setae 1 are  $23\mu$  long; setae 2 are  $31\mu$  long; setae 3 are  $35\mu$  long, setae 4 are  $31\mu$  long; setae 5 are  $15\mu$  long; supplementaries same as on tergite II. Formula: Anterior row 3-3; posterior row 5-5+2-2 supplementaries.

The absence of the three pairs of setae in the anterior row differentiates this species from all others of the genus. The number of setae in the posterior row agrees with that given for the genus by Ionesco (1935), and by Gisin (1945) for *E. armatum* Stach. See tergite VI for comment on *E. transitorium* Berlese.

Tergite VI: Anterior row same as tergite V. Posterior row is one-fourth distant from the margin; setae are spaced closer together than on tergite V; setae 1 are  $29\mu$  apart,  $29\mu$  long; setae 2 are  $31\mu$  from setae 1, and are  $35\mu$  long; setae 3 are  $23\mu$  from setae 2, and are  $39\mu$  long; setae 4 are  $34\mu$  long; setae 5 are  $12\mu$  long; supplementaries  $23\mu$  long. Formula: Same as tergite V.

The absence of the three pairs of setae in the anterior row differentiates this from all other species of the genus. The number of setae in the posterior row agrees with that given for the genus by Ionesco (1935) and by Gisin (1945) for *E. armatum* Stach. Berlese (1909, pl. 8, fig. 83), figures tergites V and VI for *E. transitorium* Berlese, but he has not shown all the pleural setae; however, on tergite VI, it appears that anterior setae 3 are absent. In *E. armatum delicatum* Gisin (1945), anterior setae 3 are absent. In the descriptions given by Ewing (1940), for tergite VI he does not mention any of the pleural setae; but for *E. pallidum* Ewing (1921), he notes that anterior setae 3 are absent, and that anterior setae 2 and 3 are absent in *E. yosemitense* Ewing (1927).

Tergite VII: Anterior row same as tergite V in only one female specimen; in the other four specimens, setae 4 are absent. Posterior row is placed a little more anteriorly than on tergite VI; setae 1 are  $28\mu$  apart,  $32\mu$  long; setae 2 are  $26\mu$  from setae 1, and are  $37\mu$  long; setae 3 are  $39\mu$  long; setae 4 are  $35\mu$  long; setae 5 are  $12\mu$  long. Instead of the usual supplementaries between setae 1 and 2, there are microchaetae; supplementaries between setae 2 and 3 are  $22\mu$  long. Formula: Anterior row 2-2 or 3-3; posterior row 5-5+1-1 supplementaries +1-1 microchaetae.

The number of setae in the anterior row differs from that given by Ionesco (1935) for the genus, and for *E. armatum* Stach by Gisin

(1945). In *E. armatum* subsp. *delicatum* Gisin (1945), one pair of setae in the anterior row is absent. The number of setae in the posterior row agrees with that given by Ionesco (1935) for the genus, and for *E. armatum* Stach by Gisin (1945).

Tergite VIII (fig. 86, a): In the anterior row, only the last two setae in the pleural region are present, 35 and 34 $\mu$  long. The other setae present I call posterior only because of their length; setae 1 are slightly posterior of the middle, 29 $\mu$  apart, 29 $\mu$  long; setae 2 are 23 $\mu$  diagonally from setae 1, near the glandular opening, 22 $\mu$  long; near setae 2 are three microchaetae. Near the posterior margin in the middle is a single seta 9 $\mu$  long. Formula: Anterior row 2-2; posterior row 2-1-2+3-3 microchaetae.

The number of setae does not agree with that given by Ionesco (1935) for the genus. The same number of setae is given by Gisin (1945) and Tuxen (1949) for *E. armatum* Stach, but the size of the setae differs greatly.

Tergite and pleurite IX: Near the posterior margin, setae 1 are 22 $\mu$  apart, and are 11 $\mu$  long; setae 2 are 9 $\mu$  from setae 1, and are 9 $\mu$  long; setae 3 are 8 $\mu$  long, in the posterior lateral corner. Formula: 3-3+1-1 on the pleurite at the posterior tergal corner, 32 $\mu$  long. (See comment for tergite XI.)

Tergite and pleurite X: The row is nearer the margin than on tergite IX; setae 1 are 14 $\mu$  apart, and are 8 $\mu$  long; setae 2 are 9 $\mu$  from setae 1, and are 6 $\mu$  long; setae 3 are 5 $\mu$  long, in the posterior lateral corner. Formula: 3-3+1-1 on pleurite, 8 $\mu$  long. (See comment for tergite XI.)

Tergite and pleurite XI: The row is on the margin; setae 1 are 8 $\mu$  apart, 6 $\mu$  long; setae 2 are 19 $\mu$  from setae 1, and are 4 $\mu$  long; setae 3 are 9 $\mu$  long. Formula: 3-3+1-1 on pleurite, 26 $\mu$  long.

The number of setae on tergites and pleurites IX-XI is the same as that given for the genus by Ionesco (1935), and for *E. armatum* Stach by Gisin (1945) and Tuxen (1949).

Tergite XII: Near the middle, a pair of setae 12 $\mu$  apart, 31 $\mu$  long; near the anterior lateral corners, setae 28 $\mu$  long; two setae posterior to the latter, 8 $\mu$  and 6 $\mu$  long; a microchaeta at the posterior tip. Formula: 4-4+1 microchaeta.

The number of setae differs from that given by Ionesco (1935) for the genus. It agrees with *E. armatum* Stach as given by Gisin (1945).

STERNITES: Here again, the setae are on the most heavily chitinized portion, and I shall refer to that part only in the description. The number of setae on sternites I-XI agrees with that given for the genus by Ionesco (1935), and for *E. armatum* Stach by Gisin (1945) and Tuxen (1949).



Sternite I: Anterior row about one-third from the anterior margin, setae equidistant,  $20\mu$ ; setae 1 are  $11\mu$  long; setae 2 are  $20\mu$  long. Posterior row at margin; setae 1 are  $15\mu$  apart; setae 2 are  $12\mu$  from setae 1; all are  $11\mu$  long. Formula: Anterior row 2-2; posterior row 2-2.

Sternite II: Anterior row; setae 1 slightly anterior of the middle,  $19\mu$  apart,  $11\mu$  long; much anteriolateral of setae 1 are setae 2, which are  $19\mu$  long; near the lateral margin,  $31\mu$  from setae 1 are setae 3, which are  $20\mu$  long, somewhat posterior to setae 1. Posterior row at margin, setae equidistant,  $17\mu$ ; setae 1 are  $9\mu$  long; setae 2 are  $20\mu$  long, at the lateral corner. Formula: Anterior row 3-3; posterior row 2-2.

Sternite III: Anterior setae 1 are slightly posterior of the middle; setae 3 are more posterior on the lateral margin. The spacing of the setae is almost the same as on sternite II; the setae are slightly longer except that setae 2 of the posterior row are  $25\mu$  long. Formula: Same as sternite II.

Sternite IV (fig. 86, *c*): Anterior row; setae 1 are slightly posterior of the middle,  $28\mu$  apart,  $12\mu$  long; setae 2, anterior to setae 1 are  $22\mu$  long; setae 3, posterior to, and  $34\mu$  from, setae 1 are  $19\mu$  long. Posterior row;  $8\mu$  from the margin,  $43\mu$  apart are setae 2, which are  $25\mu$  long; at the margin, between setae 2 and  $15\mu$  apart, are setae 1, which are  $9\mu$  long; at the margin,  $26\mu$  from setae 2, are setae 5, which are  $31\mu$  long; between setae 2 and 5, are setae 3 and 4, which are  $8\mu$  apart and  $12\mu$  long. Formula: Anterior row 3-3; posterior row 5-5.

Sternite V: The arrangement of the setae is practically identical with sternite IV. Anterior setae 1 are  $32\mu$  apart,  $31\mu$  from setae 3; setae 2 are  $26\mu$  long. All the other setae are the same length as, or slightly longer than, on sternite IV. Anterior setae 2 and 3, and posterior setae 5 are in a diagonal row. Formula: Same as sternite IV.

Sternite VI: The arrangement of the setae is the same as on sternite V. The setae are the same length or slightly shorter. Formula: Same as sternite IV.

Sternite VII: The arrangement and size of the setae are about the same as on sternite VI except that the setae are spaced closer together. Formula: Same as sternite IV.

Sternite VIII (fig. 86, *d*): Setae 1 are  $29\mu$  apart,  $32\mu$  long, and  $9\mu$  from the posterior margin; between them near the margin is a single seta  $15\mu$  long; setae 2 are  $14\mu$  long; setae 3 are  $34\mu$  long. Formula: 3-1-3.

Sternite IX: Near the posterior margin  $28\mu$  apart are setae 1, which are  $31\mu$  long; setae 2 are  $12\mu$  long. Formula: 2-2.

Sternite X: At the posterior margin about equidistant; setae 1 are  $12\mu$  long; setae 2 are  $14\mu$  long. Formula: 2-2.

Sternite XI: On the posterior margin, setae 1 are  $12\mu$  long; setae 2 are  $25\mu$  long; somewhat anterior on the sternite, setae 3 are  $29\mu$  long; setae 4 are  $11\mu$  long. Formula: 4-4.

Sternite XII: Near the anterior margin  $15\mu$  apart, a pair of setae  $9\mu$  long; on or near the lateral border, a group of three setae on each side, two are  $34\mu$  long, the third is  $46\mu$  long; at the posterior tip, a group of four setae  $9\mu$  long. Formula: 6-6.

The number of setae agrees with that given by Ionesco (1935) for the genus, and by Gisin (1945) for *E. armatum* Stach.

*Type*.—U.S.N.M. No. 59913.

*Remarks*.—The species is described from two males, two females, and one matus junior, collected by A. W. Rakosy, at 3,000 feet elevation, Sierra del Avila, Los Chorros, Estado Miranda, Venezuela, in 1947. Each specimen is on a slide. The holotype, male, has been completely cleared in lactic acid, stained with fuchsin, and mounted in damar; the four paratypes have been mounted in Hoyer solution (Faure).

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